ABSTRACT

This invention provides new, highly conductive materials comprising crystallized electron pairs within an insulating matrix. Crystallized electron pairs can combine with each other to form quasi-one-dimensional structures, quantum nanowires, that have nanoscale diameters and microscale lengths or longer. Quantum nanowires can also be formed as closed loops. Quantum nanowires comprising crystallized electron pairs exhibit very high electrical conductivity over a range of temperatures from 0 Kelvins up to the decomposition temperature of the materials. The quantum nanowires of this invention can be used in a variety of electronic, opto-electronic, electro-optical, motive, sensing and other ways to provide nanoscale structures for manufacturing small devices having low power requirements, low energy dissipation and very rapid responses.